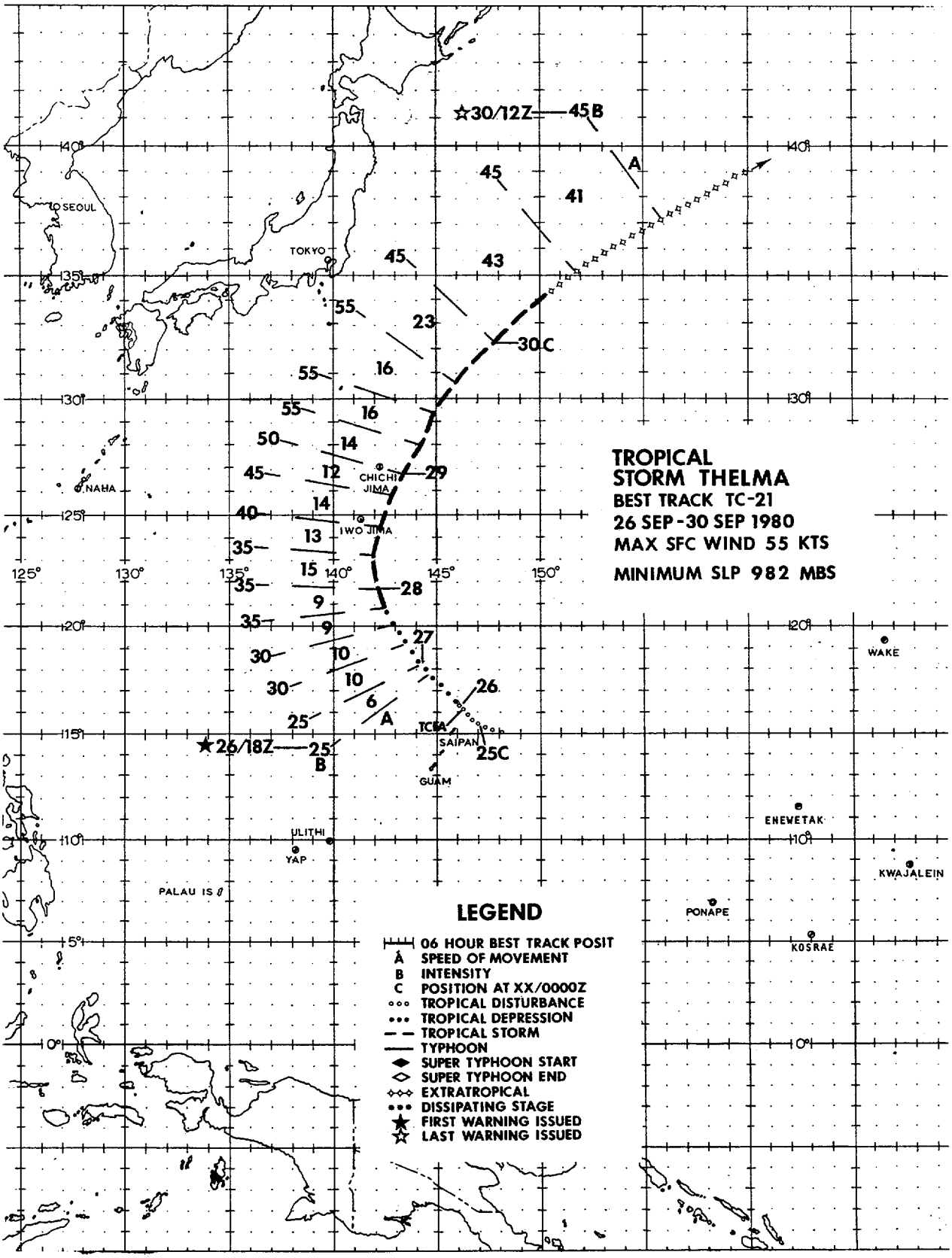
TROPICAL
STORM THELMA
BEST TRACK TC-21
26 SEP-30 SEP 1980
MAX SFC WIND 55 KTS
MINIMUM SLP 982 MBS
LEGEND
06 HOUR BEST TRACK POSIT
A SPEED OF MOVEMENT
B INTENSITY
C POSITION AT XX/0000Z
TROPICAL DISTURBANCE
TROPICAL DEPRESSION
TROPICAL STORM
TYPHOON
SUPER TYPHOON START
SUPER TYPHOON END
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
☆30/12Z
★26/18Z
SEOUL
TOKYO
NAHA
CHICHI JIMA
IWO JIMA
SAIPAN
GUAM
YAP
ULITHI
PALAU IS
WAKE
ENEWETAK
KWAJALEIN
PONAPE
KOSRAE
140°
135°
130°
125°
120°
115°
110°
5°
0°
125°
130°
135°
140°
145°
150°

Thelma began as a disturbance in the monsoon trough approximately 100 nm (185 km) north-northeast of Saipan. Although Thelma's forecast track posed few problems, analysis of the cyclone was not straight-forward due to Thelma's very abnormal structure.

Satellite imagery began showing intensification of convective activity in the maximum cloud zone within the latitude belt 10-20N from southeast Asia to the Marshall Islands on 23 September. A significant area of convection developed in the monsoon trough near Saipan early on 23 September. This convection gradually increased and began suggesting the presence of a surface circulation later on the same day. Data at 500 mb, however, indicated that the curvature in the cloud signature was associated with a mid-tropospheric circulation as no circulation was apparent from surface/gradient wind data. A circulation at the surface/gradient level was finally analyzed just south of Guam at 241200Z. By 250000Z, the low-level circulation that produced Thelma was analyzed over the Northern Mariana Islands (Fig. 3-22-1). This circulation continued to develop and drift westward while becoming the dominant circulation in that portion of the monsoon trough.

From her onset, Thelma did not display classical tropical storm characteristics. Height gradients observed by reconnaissance aircraft at 700 mb were very flat; thus maximum winds near the center were significantly lower than suggested by the central sea-level pressure (Atkinson and Holliday, 1977). Also, the maximum wind band was some distance away from the center, and the 700 mb temperature field showed higher temperatures outside the cyclone center for most of the early aircraft penetrations. Table 3-3 presents a summation of aircraft data and highlights the points presented above. Figure 3-22-2 shows the reconnaissance data plot for the last daylight penetration of Thelma. The wind field and other data presented on the plot are fairly representative of Thelma's entire life.

As previously stated, Thelma's track presented no real problems. Streamline analyses at 500 mb showed that Thelma developed just south of a break in the subtropical ridge. After following a northwesterly course, Thelma first turned northward and almost immediately thereafter began to track northeastward. Cyclogenesis/frontogenesis occurred simultaneously in a baroclinic zone that persisted throughout Thelma's life in the area from Okinawa northeastward to a point off the coast of Japan. The continual presence of this surface trough appears to be one of the factors that directed Thelma's northeastward movement (Fig. 3-22-3). Upper-level steering was provided by relatively strong westerlies which reached south to the Bonin and Volcano Islands. During her northeast trek, Thelma reached maximum intensity of 55 kt (28 m/sec). Further intensification was probably suppressed by restrictions on her upper-level outflow. Thelma continued to accelerate toward the northeast and transitioned into an extratropical low pressure system by 0400Z on 30 September.

TABLE 3-3

| Date/Time | Maximum Temperature | | Central Pressure | Intensity (KT) | | Bearing/Range |
|---|---|---|---|---|---|---|
| | Inside Center °C | Outside Center °C | MB | Observed Surface | Atkinson/ Holliday | of MAX FLT LVL Wind (DEG/NM) |
| 27/1530Z | 12 | 13 | 993 | N/O | 42 | 100/136 |
| 28/0308Z | 14 | 15 | 989* | 30 | 48 | 320/110 |
| 28/1418Z | 12 | 15 | 987 | N/O | 50 | 240/40 |
| 29/0258Z | 14 | 10 | 982 | 55 | 57 | 350/110 |
| 29/1500Z | 13 | 13 | 981* | N/O | 59 | 120/150 |

Aircraft data extracted from detailed vortex messages and peripheral data observations. (Asterisks indicate central pressure extrapolated from 700 mb data.)

*FIGURES 3-22-1, 3-22-2 and 3-22-3 are on the following pages.*

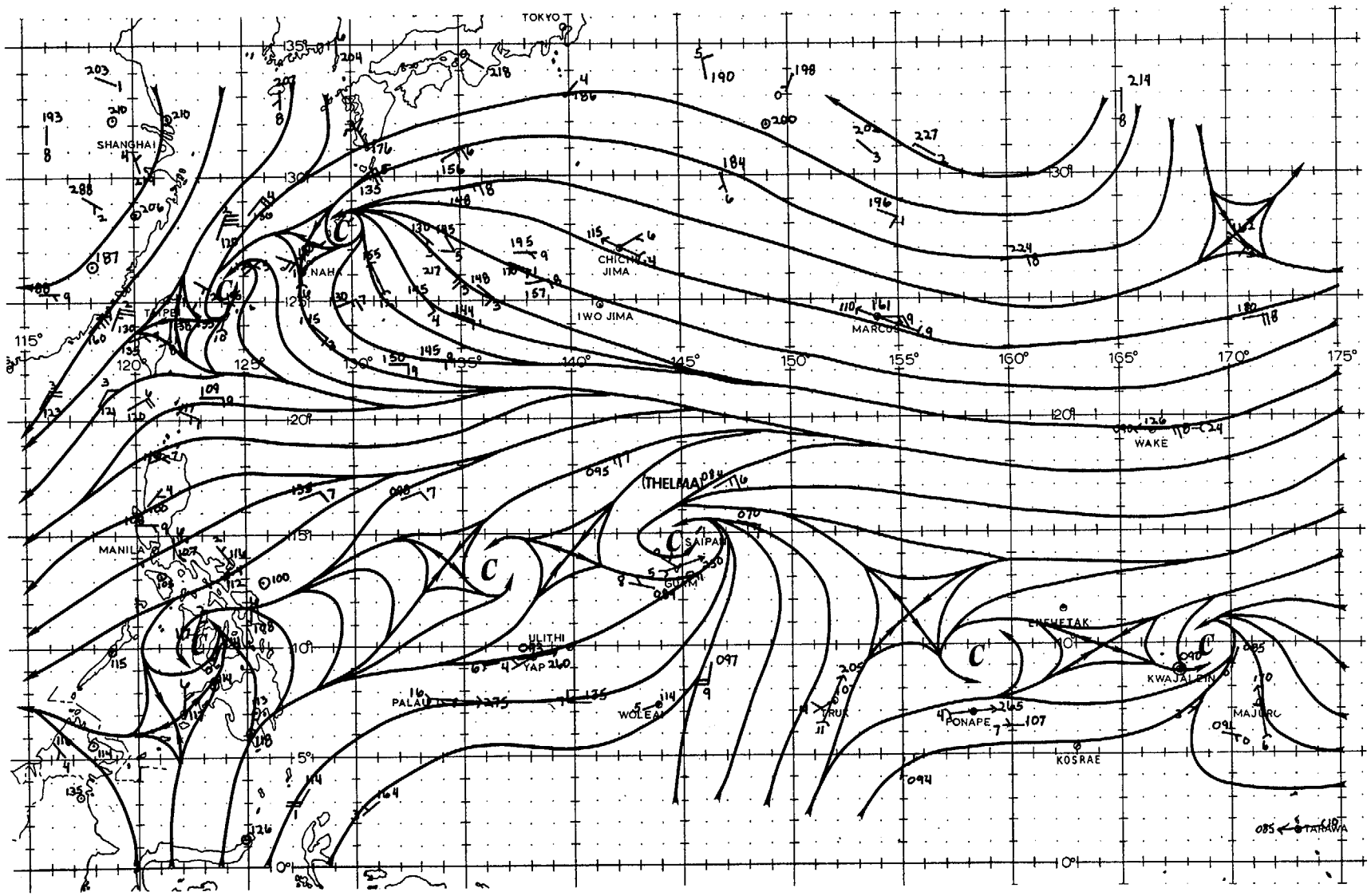


*FIGURE 3-22-1. The 250000Z September 1980 surface (⟵)/gradient-level (ddd⟵ ⟨ff⟩) wind data and streamline analysis. Wind speeds are in knots.*

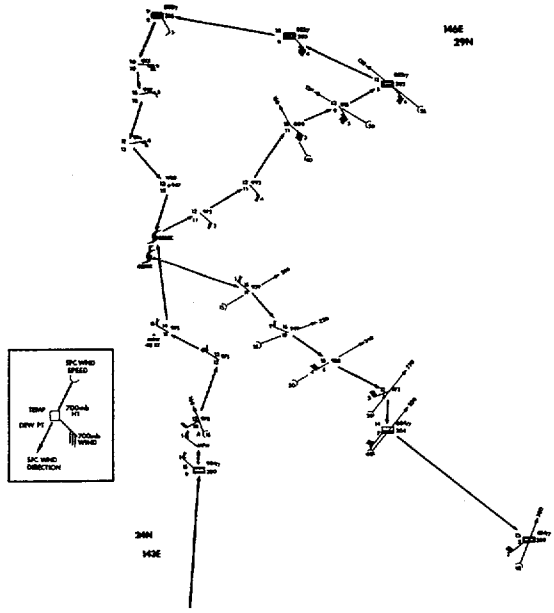

FIGURE 3-22-2. Plot of aircraft reconnaissance data for the 290300Z September 1980 fix of Tropical Storm Thelma.

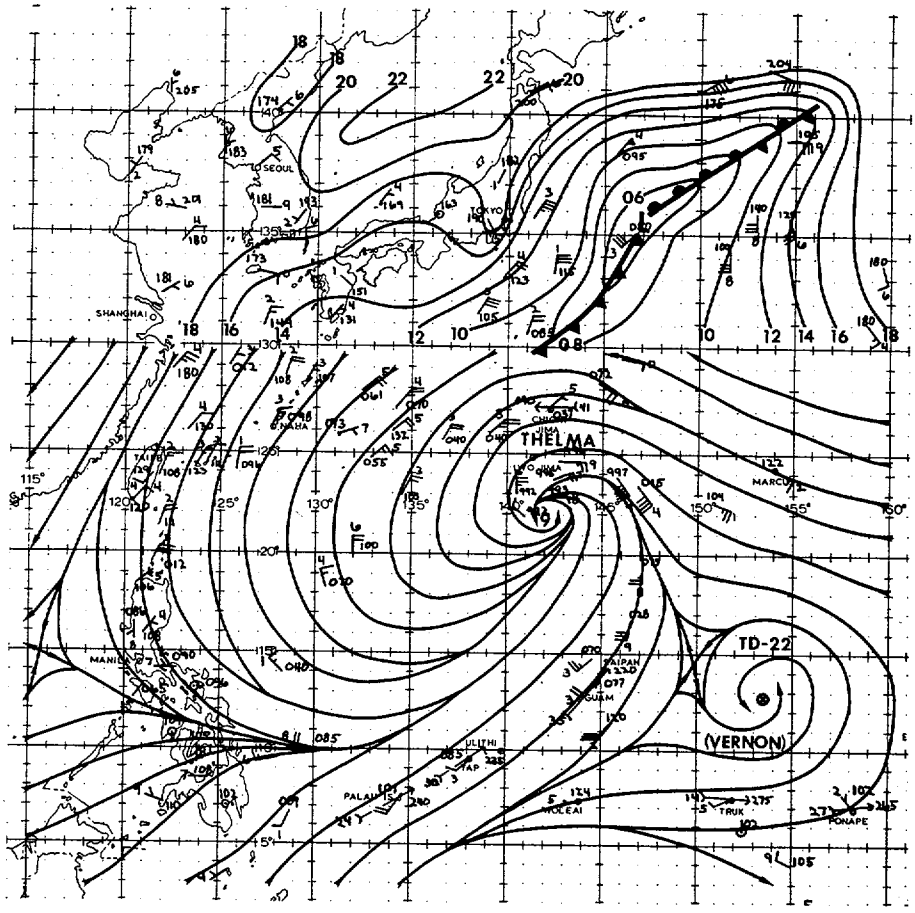


FIGURE 3-22-3. The 280000Z September 1980 surface (——)/gradient-level (ddd⟵⟨ff) wind data and streamline analysis. Winds speeds are in knots.